

What is claimed is:

1. A tetracalcium phosphate (TTCP) particle comprising basic calcium phosphate whiskers on a surface of said TTCP particle; said basic calcium phosphate whiskers having a length up to about 5000 nm and a width up to about 500 nm, said basic calcium phosphate whiskers having a Ca/P molar ratio greater than 1.33, and said basic calcium phosphate whiskers having a non-stoichiometric chemical composition.
2. The tetracalcium phosphate as defined in claim 1, wherein basic calcium phosphate whiskers have a length from about 1 nm to about 2000 nm and a width from about 1 nm to about 200 nm.
3. The tetracalcium phosphate as defined in claim 1, wherein said basic calcium phosphate whiskers have a Ca/P molar ratio from about 1.35 to about 4.0.
4. The tetracalcium phosphate as defined in claim 1, wherein said basic calcium phosphate whiskers are substantially free of a hydroxyapatite phase.
5. The tetracalcium phosphate as defined in claim 4, wherein said basic calcium phosphate whiskers comprise tetracalcium phosphate as a major phase.
6. A process for preparing a tetracalcium phosphate (TTCP) powder comprising TTCP particles comprising basic calcium phosphate whiskers on surfaces of said TTCP particles, said process comprising the following steps:
  - a) mixing a TTCP powder with a whisker-inducing solution so that basic calcium phosphate whiskers start to grow on surfaces of TTCP particles of said TTCP powder;
  - b) terminating the growth of said calcium phosphate whiskers by drying the whisker-inducing solution in the mixture, so that said calcium phosphate whiskers have a length up to about 5000 nm and a width up to about 500 nm, said basic calcium phosphate whiskers have a Ca/P molar

ratio greater than 1.33, and said basic calcium phosphate whiskers have a non-stoichiometric chemical composition.

7. The process as defined in claim 6, wherein basic calcium phosphate whiskers have a length from about 1 nm to about 2000 nm and a width from about 1 nm to about 200 nm.

8. The process as defined in claim 6, wherein said basic calcium phosphate whiskers have a Ca/P molar ratio from about 1.35 to about 4.0.

9. The process as defined in claim 6, wherein said basic calcium phosphate whiskers are substantially free of a hydroxyapatite phase.

10. The process as defined in claim 9, wherein said basic calcium phosphate whiskers comprise tetracalcium phosphate as a major phase.

11. The process as defined in claim 6, wherein said whisker-inducing solution in step a) is an acidic aqueous solution, a basic aqueous solution, an organic solvent, or substantially pure water.

12. The process as defined in claim 11, wherein said whisker-inducing solution in step a) is a basic aqueous solution.

13. The process as defined in claim 12, wherein said basic aqueous solution is a diammonium hydrogen phosphate,  $\text{Na}_2\text{HPO}_4$ , or  $\text{K}_2\text{HPO}_4$  aqueous solution.

14. The process as define in claim 13, wherein said basic aqueous solution is the diammonium hydrogen phosphate aqueous solution, and said diammonium hydrogen phosphate aqueous solution has a concentration of at least 5 wt%, based on the weight of said solution, and the mixing of said TTCP powder with said diammonium hydrogen phosphate aqueous solution in step a) is in a ratio of less than about 10 g powder per ml solution.

15. The process as defined in claim 14, wherein said concentration is 10-60 wt%, and the mixing ratio is less than about 5 g powder per ml solution.

16. The process as defined in claim 15, wherein said concentration is about 33 wt%, and the mixing ratio is about 1 gm TTCP per 13 ml solution.

17. The process as defined in claim 6, wherein said drying in step b) is carried out by heating the mixture resulting from step a) at a temperature less than about 1000°C.

18. The process as defined in claim 6, wherein said drying in step b) is carried out by separating the mixture resulting from step a) and heating the separated powder at a temperature of 50-500°C.